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# **METHOD AND SYSTEM FOR TARGETED CONTENT DELIVERY, PRESENTATION, MANAGEMENT AND REPORTING**

## **BACKGROUND OF THE INVENTION**

### **Field of the Invention**

The present invention relates generally to networks used for transmitting audio, video, voice and data, including cable television, direct-to-home (DTH) satellite, terrestrial broadcast, microwave, telephony and Internet systems, and in particular to methods for delivering multiple versions of content in a targeted manner for programmers and advertisers.

### **Description of the related art**

A variety of specifications exist for transmission of digital television and related data, including the MPEG specifications, derivatives and supersets of MPEG such as European DVB, DirecTV DSS, and Motorola/General Instrument Digicypher II (DCII). In the Internet world, new formats and protocols for video compression and transmission are constantly appearing. Within these environments, proprietary and open specifications have evolved for transmitting data and applications which can operate independently of or in conjunction with the default audio and video programming, examples of which include ATVEF, OpenTV, Canal+ MediaHighway, DVB MHP, and others. Security mechanisms have evolved with these systems to manage authorization and purchase functions, using smart card chips and encryption schemes. Security systems are provided by companies like Nagra, Irdeto, and NDS.

Within the digital television world, advertising technology has remained relatively unchanged since television's widespread introduction in the 1950s, with no targeting capability or response capability. Some technology has been proposed for targeting

content in the area of advertising, including but not limited to U.S. Patent numbers 5,319,455 (System for distributing customized commercials to television viewers), 5,155,591 (Method and Apparatus for providing demographically targeted television commercials), 6,018,768 (Enhanced Video Programming System and Method for incorporating and displaying retrieved Internet information segments), and 4,602,279 (Method for providing targeted profile interactive CATV displays). Additional patents valuing and grouping individuals for the advertisement targeting process have been issued or filed, including 5,724,521 (Method and apparatus for providing electronic advertisements to end users in a consumer best-fit pricing manner), and applicant's co-pending United States Patent application entitled 'Method and System for Targeted Advertising'.

### Background

Digital television systems, whether as broadcast systems such as over-the-air NTSC or ATSC, cable television, DTH satellite or microwave; point-to-point data systems like the Internet; or switched systems using DSL in all its variants including ADSL, dual ADSL and VDSL, now simultaneously transmit hundreds or thousands of services, each consisting of one or more streams of audio, video, data, and interactive applications.

While television is still by far the most popular entertainment and information medium, the Internet has been viewed by some as a superior technology because of its capabilities for dynamically targeting content based on user input and information, and for identifying the viewer and reporting back on the viewer's access and response to the content.

Methods and systems have been designed and proposed for adding targeting and response capabilities to television advertising. These methods appear in large part to have been developed in isolation of many of the existing and evolving realities of the digital television, including the following:

- The requirement for any system to be adaptable and usable by legacy and new digital receivers

- The ability of new receivers to connect to and receive content not only from new network types, but also combinations of existing and new network types and protocols, including the Internet, ATM, DSL, RTP, WAP, DoCoMo and others.
- The requirement for the system to evolve with new receiver capabilities, moving from the ability to access content only from the transmitted streams to acquiring content from local disk storage, near-local storage through network or switched connections like VDSL, and faster Internet connections – while maintaining compatibility with existing receivers.
- The ability to provide reporting and feedback through relatively low-bandwidth and expensive telephone connections, as is the case for satellite and microwave systems, securely and at a reasonable cost
- The availability and evolution of open standards and potential standards for interactive applications, including examples like ATVEF as implemented by Liberate, Microsoft and others; OpenTV; Canal+ MediaHighway, DVB MHP and others
- The requirement to dynamically adapt the targeting and selection mechanisms to meet programmers and advertisers changing needs
- Security and confidentiality for storage, retrieval and reporting of all customer data and actions
- The targeting of not just the advertisement, but any form of content from data to applications to television programs
- The ability for all of the above to work in a passive television viewing environment, without requiring input or interaction from the user
- The ability to work in receivers where short or long-term persistent storage of profile information is not available
- The ability to control the allocation of resources like disk space and memory storage on the receiver in an environment where multiple interactive services may be competing for the resources, and where the entity owning or managing the receivers for the customers wishes to control which services are allowed access to the resources or information, particularly when this information may be considered confidential for the viewer, and should not be accessible to just any interactive application transmitted to the set-top

- The requirement to handle all of the above considerations in set-tops which must be provided at a reasonable cost, or which have existing physical limitations.

The business of broadcasting has also evolved. Major operators like Time-  
5 Warner Inc. (New York, NY), USA Networks, Inc. (New York, NY) and Alliance Atlantis  
Communications Inc. (Toronto, Ontario) each have multiple services, and must sell  
advertising space across these services. Opportunities for targeting content, and, in  
particular, advertisements, should be managed across all properties for an operator.

Digital receivers are rapidly evolving, with capabilities like dual-tuners, disk drives  
10 for program recording and playback, and high-speed Internet access. These capabilities  
open the door for the invention of new opportunities to provide content and advertising,  
as well as new forms for content

New platforms for information dissemination are also appearing. Telephones,  
whether stationary, connected through the Internet, or cellular, are evolving into  
15 sophisticated devices with capabilities for receiving and sending text messages, faxing,  
connecting to the Internet, and playing games. Content can be delivered to these  
devices in the form of new information, games or advertisements. Security, as with  
digital television systems, is sophisticated and can also include smart cards .

To make targeted advertising and content delivery a reality for large-scale  
20 deployment, the technology must start by making innovative use of legacy receiver  
facilities and technology, by working with official and de-facto standards for transmission  
and interactivity, and by having the ability to take advantage of new features while  
maintaining compatibility or interoperability with the legacy systems.

## SUMMARY OF THE INVENTION

The present invention relates to methods and systems for transmission, management and presentation of targeted content to viewers and users of a digital medium such as digital television, radio or Internet, and methods and systems for reporting the viewing records and habits to a data collection system, with content consisting of audio, video, data, applications, or any combination of them for viewing and/or advertising purposes. All of the methods use existing facilities that are in actual or planned large-scale deployments, and introduce new facilities.

Metadata (consisting of content information, information on opportunities for presenting the content, and information and processes for matching content to opportunities) and content are transmitted to a digital receiver. The metadata is contained in existing or new transmission structures and facilities and relates to the co-transmitted content or to content available from other sources, synchronously or asynchronously.

Management methods in digital receivers monitor the transmitted stream and provide storage and storage management mechanisms for alternate versions of content, acquire content from alternate sources, control access to the storage and data, and securely acquire, store and retrieve characteristic information used in the selection process.

Presentation methods in the receiver display the content based on opportunity information from the transmission stream, opportunities created by function invocation by the user, physical and temporal content availability, processes for matching the content to the opportunities. The matching process may have complex requirements including multi-service broadcaster requirements, multi-message content sequencing, and user preferences including ratings and permissions such as those used in implementations of VCHIP technology, which is used to broadcast ratings with the programming and allow receivers to block viewing of programs with ratings deemed inappropriate. Combinations of all of the above methods provide precise timing and event synchronization capability for the display of the content.

The reporting methods report content viewing information to a data reporting facilities.

Any data or processes requiring security are managed through encryption and identification mechanisms or through interfaces to accessible security systems available within the receiver or on the network.

### **Brief description of the drawings**

The present invention will be described with reference to the accompanying drawings wherein:

- FIG. 1 is a schematic of a network of one embodiment of the present invention
- FIG. 2 is a schematic of a receiver in one embodiment of the present invention
- FIG. 3 is a schematic of the functions required in a receiver for content targeting
- FIG. 4 is a table representing data for describing targeted content
- FIG. 5 is a table representing data for content targeting opportunities

### **DETAILED DESCRIPTION**

In the following detailed description numerous specific details are set forth in order to provide a thorough understanding of the present invention. However, it will be understood by those skilled in the art that the present invention may be practiced without these specific details. In other instances well know methods, procedures, components, and circuits have not been described in detail so as not to obscure the present invention.

Fig. 1 shows the functional components of a network system 10 for the distribution of content, which are applicable to a variety of content distribution systems, including cable and satellite television. The components could reside on a single physical system or on separate systems linked by one or more communication networks. Multiple instances of each component may also be required. The network 10 includes a plurality of content providers 11 from external sources 11a as well as internal content 11b produced by the network operator. The content consists of audio, video, data, applications, or any combination of all of these, that is made available to receivers

by broadcast or point-to-point transmission or requests. Examples include television or radio programs, computer games, images, and news and stock tickers. Content may also be available in pre-encoded form from a content server 11c. Content from the server may be transmitted in real-time, or slower or faster than real-time for purposes of caching content for deferred viewing.

The content stream from the provider can deliver one or more services, with each service consisting of one or more content streams. A content stream can have several components embedded to provide the service, or can consist of multiple distinct streams with various components of the service.

Examples of content streams include an NTSC video signal with audio, video, closed captioning and ATVEF transport A interactivity all embedded into the signal; a series of separate MPEG transport streams for audio, video, interactivity, and conditional access, and a series of packets on the Internet with internal identifiers for the audio, video and interactivity components. Other mechanisms and combinations of mechanisms will occur to those of skill in the art.

Components may be added or deleted from content using a pre-encoding device 18 or a post-encoding device 19.

The content flows into encoders 12 which process the content prior to distribution. From the encoders, the processed content flows into a content aggregator 13 for delivery, through a network interface 14 to a network 15 for delivery to a plurality of receivers 16. The network may provide multiple facilities for communication between the receiver and the control networks, and may consist of separate distinct communication facilities.

Along with the content from content providers 11, various forms of data are transmitted to aid the viewer in the use of a multi-channel, multi-service system. This type of information, which can include the electronic program guide and related tables for access, frequency and other information for receiving and describing the signal, are known as service information (SI) tables. SI tables are produced and transmitted by the SI generator 17, and can also include various forms of control information from external sources to control access for content like subscription services and pay-per-view



movies, and other forms of information on the content that may be of use to the receiver  
16.

Security and authorization are provided by the conditional access system 20  
(CAS). The CAS determines which content the viewer is allowed to access. The CAS  
5 can include a content encryption system 24 for protection of the content during  
transmission, permission management 21 for control of authorizations on a per user or  
receiver basis, content management 22 for controlling access to content, message  
encryption 23 facility to secure the communication authorization and other messages for  
transmission, and a receiver component 26 for communication with the operator's CAS  
10 and local secure storage of permission and content access information.

In one embodiment, the content is an audio and video signal from a broadcaster,  
and the encoder 12 is an MPEG-2 compressor which converts the signal from analog to  
digital format and then compresses and synchronises the components into MPEG-2  
data streams. The aggregator 13 is an MPEG-2 multiplexer which creates a  
15 multiplexed transport stream delivered to the network interface 14, which in this case is  
a modulator appropriate to a cable television network. The network 15 is the system of  
amplifiers, transmitters, re-transmitters, copper cable, fiber optic systems, switches and  
routers used for distribution of the signal. The receivers 16 are connected to the cable  
network, and communicate back with the operator using Internet, DAVIC (Digital Audio  
20 Video Council, Geneva, Switzerland) and/or other command protocols supported by the  
network 15.

In another embodiment, the network 15 consists of a DTH (direct to home)  
satellite or microwave (MMDS, LMDS) television distribution system and the telephone  
network. The receiver 16 is connected to receive content through an antenna, and can  
25 communicate back with the operator through modem connected to a telephone line.

In another embodiment, the network 15 consists of an xDSL and ATM network  
where the content flowing to the receiver 16 is based on a selection from the receiver.  
The aggregator 13 is an ATM switch, and the receiver functions are distributed among a  
physical receiver at the viewer's location and the digital subscriber line access  
30 multiplexer (DSLAM) and related switching gear to which the receiver is connected.

In another embodiment, the network 15 is an ATSC terrestrial digital broadcast system, which includes multiple TV services within the signal, with or without a return path on the network.

In another embodiment the network 15 consists of the Internet.

5 In another embodiment, the network 15 is a conventional, wireless (cellular) or IP telephone network.

Other embodiments will combine various elements above – for instance, a receiver on a cable or satellite transmission system may also have high-speed Internet access for access to content. Other methods and combinations will occur to those of skill in the art.

10 In one embodiment, the SI generator 17 is a spooler, which constantly retransmits a program guide on the network for access by the receiver 16. In another embodiment, SI information is dynamically requested over the network 15, and the SI generator includes server facilities to provide the information.

15 In one embodiment, the content server 11c is a video server playing out movies, advertisements and other programs. In another embodiment, the content server 11c is a server on the Internet from which applications, audio and video files are transmitted.

Fig 2 depicts the functions and facilities required for a viewer to receive the content from a network described in figure 1. A receiver's functions and facilities may be contained within a set-top device on the viewing premises or distributed throughout a network. The  
20 receiver can have a plurality of content processing systems 40 (CPS). Each CPS requires a network interface 41 for communication to and from the operators' network(s), a decryptor 42 for deciphering any secured information, a decoder 43 for converting from the network format to the viewing or usage format, and a processing element 44 for handling any instructions, graphics processing, multi-media combining or  
25 other formatting required before presentation to the user. A management system 31 is required for co-coordinating the operation of the various functions. Content storage 32 is used to record information pertinent to the usage of the system, and for content storage and playback.

30 The receiver component 26 of the CAS 20 can consist of one or more receiver content authorization systems 50 (RCAS), which control access to content and facilities independently or in conjunction synchronous or asynchronous communication with the

CAS 20. Before allowing content to pass through the decryption 42, decoding 43 and other steps required for viewing or usage, the management system 31 may communicate with the RCAS 50 to determine if access is allowed or to obtain access through purchasing or other mechanisms, as is typical in impulse pay-per-view purchases. The RCAS process 50 may include protected storage 52, processing and processes 53, access to which may be restricted through interfaces and protocols. Separate encryption and decryption facilities 51 may be included for secure management of communications to and from the RCAS.

Examples of RCAS 50 include digital television conditional access systems implemented with individual encryption of each content stream, encryption key generation systems, command and authorization streams which are also encrypted, and capture, decryption and storage of CA permissions within the receiver or separate facilities such as a smart card within the receiver. Access to services is based on permissions stored within a smart card, a combination of a smart card and a security module containing software to manage entitlements, subscriptions, e-commerce transactions or other functions and hardware interfaces to the receiver and the smart card, or other secured facilities within the receiver. The smart card or combination of smart card and PCMCIA module with integrated smart card reader of the DVB Simulcrypt standard of the European Telecommunications Standards (ETSI) and OpenCable POD Copy Protection System specifications of Cable Television Laboratories Inc. (CableLabs) (Louisville, Colorado), and the Subscriber Identity Module (SIM) of the GSM Association (London, UK) are prominent examples of this type of security over satellite, cable and cellular telephone networks.

As another example, the receiver can perform an authorization check whenever access to content is requested, as implemented on switched packet networks using TCP/IP, ATM and other protocols, including the Internet and the various authorization schemes supported by servers, and digital subscriber line (DSL) distribution networks, including the ADSL, VDSL and other implementations. Other security systems and authorization mechanisms will occur to those of skill in the art.

As another example, a receiver may have facilities, including a smart card, for the enabling of electronic commerce applications. WebTV receivers from Sony and

Echostar Technologies Corporation (ETC) are examples, with the ETC receiver including both digital television conditional access smart card and expansion space for an e-commerce smart card.

As another example of a security system, a receiver is equipped with a web browser and similar facilities with SSL and digital signature software for securing communications and e-commerce as is typical in Internet applications. These facilities can be in addition to other hardware and software based CAS, including smart card systems.

As another example, the security system is implemented as a smart card in PIM format within a cellular telephone.

Physical embodiments of receivers include any or all of the following operating alone or in combination: digital set-top cable and satellite receivers; integrated components within digital televisions; personal computers with appropriate network connections, cellular telephones and personal digital assistants (PDAs) connected through wireless networks and occasional computer network hook-ups, and gaming consoles. A receiver's functions may be contained within local equipment or distributed throughout a network. For example, when using xDSL equipment or the Internet, a channel change request to a set-top receiver sends a signal to control equipment on the operator's network, which changes the program stream being transmitted to the receiver. Embodiments can include a plurality of content processing systems – for example, a receiver may have multiple processing streams to allow simultaneous processing of multiple streams for picture-in-picture viewing, watching one program while recording another to storage, or surfing the Internet while watching a television program. Storage may be included in the receiver and/or available from a network resource.

In one embodiment, content storage, RCAS facilities and other functions of the receiver may be provided or augmented by storage on a network which is provided by the operator of the network. The storage can consist of a portion of storage with a maximum capacity assigned by the operator. The maximum capacity can be based on an actual physical quantity of storage, or a virtual quantity of storage, where multiple

users can share the same instance of content in storage, in which case the maximum storage for a viewer is based on the content requested to be stored by the user.

In another embodiment, content storage 32, RCAS facilities 50 and other functions of the receiver may be provided or augmented by sharing resources among one or more receivers and equipment accessible to receivers on a network within the viewer's premises. Individual set-tops can share disk space among them; personal computers on the network can receive alternate versions of content, which can be selected by the targeting and matching processes; and storage on the personal computers can be used to record content. Authorisation, logging and other facilities may be performed on one device for other connected devices.

Physical embodiments of the processing 44 and management 31 components can receive, process and present to the viewer applications that integrate text, data, graphics and audio/video content, interact with the user for input, and provide feedback across a network connection. At the time of this writing, examples of interactive systems include television receivers and PCs equipped with OpenTV, Canal+ Mediahighway, DVB MHP, WebTV and Liberate, and cellular phones and PDAs with WAP and NTT DoCoMo. Implementations may take the form of an embedded software system with the required functions, an operating system with integrated functions, or applications and libraries accessible to an operating system or embedded system.

### **Content targeting overview**

The targeting of content is broadly defined as the exploitation of opportunities to present viewers with one of a number of alternative versions of content. Opportunities can be based on segments of content that can be substituted for alternate segments; on dynamic alteration of the content; and on presentation based on the invocation of functions by the user.

**Content** consists of audio, video, data, applications, or any combination of all of these, that is made available to a viewer by broadcast or point-to-point transmission or requests. Examples include television or radio programs, computer games, images, and news and stock tickers

When the opportunity for content targeting is presented, appropriate content is selected to exploit the opportunity. In this way, the content the viewer receives can be specifically tailored to the viewer, without the tailoring and selection process necessarily being apparent to the viewer. While user input is not required, data and preferences entered or selected by the user can be incorporated in the process.

When the content is presented and viewed, the receiver can record the results of the content view and report the results to a reporting facility. Based on the results, the content providers can further tailor the content and parameters to match content to the desired viewers.

In one embodiment, the opportunity is provided by advertisements located at pre-determined points within a television program. All viewers who selected the program see the same program, but may receive different versions of the advertisements based on parameters set by the broadcaster. The location of the advertisements within the program can be relative to the start of the program or based on a trigger in the program stream, so that the opportunities can be used whether the program is broadcast live or replayed from storage.

In another embodiment, the opportunity is provided by scheduled segments within a television program, and the segments the viewer sees are based on parameters selected by the broadcaster. For example, during a news show, a specific section of the show allows the viewer to see more business, sports or entertainment news, based on the viewer's preferences.

In another embodiment, the opportunity is provided by information within a game, graphical application or video program which allows a portion of the content to be replaced. For example, a baseball video game or program may include a background billboard, which is used to display an advertisement, in still or moving video form. The advertisement is selected based on parameters and functions selected by the programmer.

In another embodiment, the opportunity is provided by the invocation of a receiver function by the viewer. When the viewer first turns on the receiver, a short advertisement that has been cached on the receiver is displayed before other content

can be viewed. Use of other functions like Pause or Play can result in ads being played, and the ad can be designed to match the opportunity.

Fig. 3 illustrates the functional components required within a receiver for content targeting, which together are referred to as the targeting methods 60. The functions are required for matching the content to the opportunities. The management methods 61 process the content descriptors and assess which content to retrieve for possible presentation. The presentation methods 62 process the opportunity descriptors and the opportunity events, match the content to the opportunity, present the content, and store the result of the viewing in storage 63. Both the management methods 61 and the presentation methods 63 can access the storage 63 for data to assist in the decision making process. The reporting methods 64 retrieve and process viewing information, and send the information to a network reporting facility 65. Data used in the decision making process is placed in and retrieved from storage 63 by the management methods 61. The management methods 61 receive or retrieve the data from the network, or from the presentation methods 62 through which the viewer interfaces to retrieve, add, delete or modify the data.

The secure facilities 70 can provide portions of the management methods 61, presentation methods 62, storage 63 and reporting methods 64. Security facilities provide controlled access to the data, and can also provide encryption, decryption, processing and communication facilities for the methods 61, 62 and 64.

In one embodiment, the targeting methods 60 in whole or in part are provided as software embedded within a receiver, as part of the operating system or functions accessed by the operating system in the receiver management system 31.

In another embodiment, the targeting methods 60 in whole or in part are implemented by a combination of instructions included in the receiver management system 31 and instructions transmitted within the content and opportunity descriptors and handled within the processing system 44.

In another embodiment, the targeting methods are executed in whole or in part within a processing module which is loaded on the receiver and can be updated using receiver software updates or targeting mechanisms.

In another embodiment, a portion of the instructions and storage within the targeting methods is processed within the facilities of a content authorization system 50, which can include a smart card. The RCAS 50 can be dedicated to the content targeting processes 60; dedicated to the a digital television conditional access system which is extended to provide storage and processing functions for content targeting purposes; dedicated to an e-commerce subsystem which contains its own smart card; or have some dedicated components and some shared components between digital television authorization systems, e-commerce systems the targeting methods 60 through multi-application smart card technology which allows multiple services to exist independently on the same smart card. Example of shared application smart card systems include MultOS, JAVA for smart cards, and other systems that will occur to those of skill in the art.

#### **Content selection using content descriptors**

Fig.4 shows a list of content and related characteristics. The content type 81 allows the receiver to determine if it is capable of showing the content. For example, alternate versions of a single ad may be available as different audio/video clips or as a graphical application with interactivity options. A receiver without interactivity would ignore the application version. The type may be represented as a value or as a data structure representing complex options within the piece of content. In one embodiment, the data structure is represented as a data structure showing both the properties and the requirement for presenting those properties. In the table, clip "Ad 1 with optional interactivity " indicates that audio, video and interactivity are present in the clip, but interactivity is not required. A receiver not equipped for interactivity could still show only the audio and video. Clip "Ad 2 with mandatory interactivity" has audio and video that is directly tied to the interactive component, and could not be used by this receiver.

The content source 82 allows the receiver, based on its capabilities, to determine if the content is accessible. The content characteristics 83 describe the contents targeting attributes. The number and types of characteristics are dynamic, and can grow or change over time. Content characteristics can include but are not limited to:



- Temporal sensitivity – including maximum showings per time interval; minimum intervals between showings; time window in which the content can be used.
- Repeatability – maximum number of showings
- Characteristics for matching the content to the opportunity
- 5   • Conditional access system control information
- Opportunity type
- Access rights to identify the source of the content.

Other characteristics are known to those of skill in the art.

10       The content identifier **84** is a unique code used for storage, and retrieval and for reporting of the content's usage. The identifier can also include a sequence component to indicate that the content in question is one of many in a series, and its sequence within the series.

15       Access rights within the characteristics are used to ensure that the content, and, in particular, its use of resources like storage, network and processing facilities, is appropriate to the receiver and the operator's network(s). Use of access rights is particularly important for operators, as fees and technical considerations may be required for the operator to allow the application to be transmitted. As an example,  
20   commands may be contained within the interactive stream, but not permitted for all applications.

In one embodiment, access to storage is controlled through privileges in secure facilities **70**. The authorization codes required are encrypted and included as a parameter in the characteristics. Encryption at the head-end can be performed by the  
25   CAS **20** or in a separate system, including content injectors **18** or **19** located at the network operator's site, content supplier sites, or other service provider sites, while decryption at the receiver and authorization for access to facilities is handled within the secure facilities **70**. Message encryptors **23** are commonly implemented in conditional access systems, and implementation details will occur to those of skill in the art.

30       In another embodiment, the security system uses Kerberos-style tokens with privileges, privilege contexts like time durations from servers on the Internet or within

the operator's network. The Kerberos Network Authentication Service is a specification of the Internet Engineering Task Force (IETF), and other similar specifications are known to those of skill in the art.

## 5 Opportunity descriptors

Fig. 5 shows a list of content display opportunities.

The opportunity type **85** describes how the content display opportunity will be initiated. Mechanisms include an absolute schedule, with a time at which content is to be presented; a relative schedule, with a time relative to another event or trigger; a function invocation, where the use of a feature on the receiver can trigger the display of content. The opportunity content list **86** shows the content that can be selected for display. This field is related to the content identifier **84** of fig. 4.

The opportunity context **87** determines when and where the content is to be displayed.

Examples of context include one or more of the following, and are not limited to:

- A specific stream – the content is only to be displayed on a given service
- A group of streams – the content is to be displayed on any one of a number of services
- A time window for function invocation – the content is to be displayed if the user hits the pause button between 18:00 and 19:00
- The invocation of a function on the receiver.

The opportunity identifier **88** uniquely identifies the opportunity for reporting purposes.

Function invocations are based on viewer input through receiver controls, including and not limited to switches on the receiver, remote controls, mice, keyboards and other input devices; commands and trigger signals sent with the video; commands sent across a wired or wireless network through other devices. Opportunities are tailored and customized for a receiver's capabilities, and may be based on the invocation of a series of one or more functions, and the timing and context of the function invocation.

A result of a condition test involves the execution of a complex function in which a variety of conditions can occur based on data from the network and input from the user.

In one embodiment, a receiver has an electronic program guide (EPG) in which advertising can be displayed in a portion of the display, in text, audio, video, still or animated graphic or other form. The opportunity is presented by the invocation of the EPG.

In one embodiment, the receiver is equipped with storage facilities for audio/video content, and has the ability to play back the content with functions similar to those of a video cassette recorder (VCR), including but not limited to **ON**, **OFF** fast forward **FF**, **rewind REW**, and **PAUSE**. The algorithm for assessing the opportunity not only matches the content to the opportunity, but also determines if the opportunity will be exploited in this invocation by assessing the timing of prior function invocations.

In one embodiment, the receiver is used to play video games, and when reaching an appropriate point in the game, a content display opportunity is created and exploited.

Methods can use length, format and type to match the opportunity. For example, an advertisement that is displayed when the **PAUSE** button is selected may be required to not have audio, as the pause is often selected to perform another task like answering the telephone in which the audio from the receiver would be a distraction. Very short duration advertisements may be played when the user starts playback. A series of short advertisements may be created to form a more sophisticated message when played back through a series of function invocations.

Algorithms may be designed to use multiple facilities to ensure a high probability of showing a sequence of content within a give timeframe, with a high degree of independence of the content being watched. For example, a content provider like Time Warner with multiple services (CNN, HNN, TNT, CNNFN, etc.) may request that a series of advertisements be presented in sequence between 20:00 and 22:00, taking advantage of opportunities occurring on all their services from function invocation. For each advertisement in the series, multiple versions may be available, and the matching algorithms for the opportunities will make the appropriate selection.

The opportunity method **89** indicates which method should be used to match the opportunity to the content. The method may be a reference to a function available in the receiver; a function that is acquired from the network; a function that is included in the opportunity descriptor; or a combination of all of the preceding, with the appropriate method or combination of methods being selected based on the capabilities of the receiver and connected network.

In one example, the opportunity with description **Ad insertion when user returns from pause** in figure 5 uses method **match\_to\_pause\_duration**, and the selection is based on the viewer returning to viewing after selection the pause function. The method is designed to minimize the annoyance of the user, and is based on the duration of the pause and the time since pause was last used. The results of the algorithm are that:

- The ad will not be shown if there was a return from pause in the last 5 minutes
- If the pause was used within the last 30 minutes, then an ad will be selected that is less than 10 seconds in length
- If the pause has not been used in the last hour, then an ad of 30 seconds or less will be played.

The opportunity descriptor **90** is a set of data that matches viewer group characteristics with a probability for each viewer group to be a viewer during the opportunity. Processes and methods for this type of match can be found in the applicant's co-pending application entitled "Method and System for targeted Advertising". As is the case for content descriptors, the opportunity descriptors may include encrypted components using the same encryption and decryption schemes.

In one embodiment, the opportunity method **89**, in whole or in part, is executed within secure processing facilities **71**, which may be part of a smart card. The processing can include parameters and algorithms already in the secure storage **72**, parameters and algorithms in encrypted or unencrypted format passed to the secure processing facilities **71**. In this way, the processing may forbid the retrieval of data by

unauthorized or any functions outside of the secure facilities, and only the results of the match are returned to the requesting method.

5

### **Content descriptor and opportunity descriptor transmission**

The content descriptors are transmitted to the receiver in any of the content transmission mechanisms outlined in, but not limited to, the descriptions of figure 1.

10 In one embodiment, the content and opportunity descriptors are provided as data in a joint stream or in separate streams to a process on the receiver. The format is appropriate to the network, and examples include DVB TCP/IP streams on a satellite network and an IP data-casting stream on the Internet. Multiple instances of descriptor and content streams may occur, each associated with a content service like a television  
15 channel; or the content streams may be in streams which are independent of the content service.

In another embodiment the content and opportunity descriptors are included in the vertical blanking interval or other portion of the video signal as is done today for closed captioning, teletext and analog TV ATVEF transport A, or MPEG mechanisms for  
20 carrying closed captioning fields and related data within picture headers and control information.

In another embodiment, the content and opportunity descriptors are included in interactive content streams as data, functions, functions with parameters, and/or function calls to functions already stored within the receiver. Examples of interactive  
25 content streams include Java TV, ATVEF, OpenTV and other systems that will occur to those of skill in the art.

In another embodiment, the content and opportunity descriptors are included in fields within other tables and Service Information (SI) structures of the underlying medium. Within DVB systems, the content and/or opportunity descriptors can be carried  
30 in one or more private descriptor fields of the Event Information Table (EIT), which carries EPG content.

Content and opportunity descriptors are not necessarily transmitted separately. In a simplified implementation, the content and opportunity descriptors may all be included within a function call, with the function representing the method of the opportunity descriptor.

5

### **Matching of opportunities to content**

Among other methods, the characteristics of the content and opportunities can be matched based on methods and systems described in the applicant's co-pending United States Patent application entitled "Method and System for Targeted Advertising". The characteristics for matching can include, but are not limited to, any or all of:

- Demographic characteristics
- Psychographic characteristics
- Temporal characteristics
- Geographic characteristics
- Behavioral characteristics

15

The selection of the content alternatives, the selection and attribution of characteristics to opportunities and content, the transmission mechanisms selected for the content and opportunities, and the methods used for matching the content and opportunities can be based on yield management methods, an example of which is optimal dynamic pricing. The selections can be based on data statistically derived from the characteristics of users or groups of users, so that matching criteria can be selected without identifying individual viewers. The potential for dynamic pricing is maximized in this invention by the ability to update content and/or content characteristics and to transmit matching methods as characteristics up to the time of the exploitation of the opportunity.

20

25

It is not a requirement of the system to have all receivers report the results of content viewing and content selections. The targeting and pricing can be applied to receivers using viewer characteristics known to the operator and usable within the methods described herein, with viewing results provided by a sample of receivers, or by an independent sampling of viewers with similar characteristics.

30

### **Delivery of alternate versions of content**

As described in prior art, multiple versions of a television channel can be  
5 transmitted synchronously, and, using a variety of mechanisms based on user input, the  
receiver can switch between the different channels to create a custom version of the  
program.

This invention provides four different mechanisms for synchronous content  
transmission. The first method involves a synchronization of multiple streams of  
10 unrelated content. The streams are related only for targeting purposes, and not by their  
content. Each stream has different ads; however, the timing of the ads is synchronized  
across the streams. At the start of each ad, the receiver can switch to a different  
channel for the duration of the ad if the ad on the other channel is determined to be  
more appropriate, or if it is a version of an ad that has not been seen by the viewer.

15 The second method involves adding additional streams for alternate versions of  
the content. As in the first method, the streams are linked to a plurality of content  
streams which are related only for management purposes, and not by content. By  
scheduling advertisements at different times on the content streams, the alternate  
content streams can be shared among the principal content streams.

20 The third method makes capacity available by manipulating content streams to  
eliminate the redundancy caused by simultaneous substitution on networks where  
regulations require that when the same program is broadcast simultaneously from a  
local provider and a foreign provider, that the local provider's program replace the  
foreign provider's program on the foreign channel broadcast. Current network  
25 implementations result in the local program being transmitted redundantly on both  
channels.

The fourth method makes capacity available by placing content on services  
which are not broadcast 24 hours a day. During the off periods, the bandwidth of the  
services can be used either within the service definitions or as separate services which  
30 use the bandwidth resources of the off-air services.

In switched environments such as but not limited to DSL networks and video speed Internet, with sufficient pre-roll time, content can be queued and selected at the appropriate time. Within xDSL and Internet environments, a single stream of content can be multicast to a plurality of receivers.

5 For asynchronous content transmission, any of the network mechanisms discussed (broadcast or point-to point) can be used. Content on these networks can be transmitted in real-time, or slower or faster than real-time at fixed or variable speeds at alternate times, using transmission formats different from the normal video transmission. For example, a satellite stream for alternate content being transmitted  
10 asynchronously may consist of broadcast TCP/IP file transfers within DVB streams, instead of the MPEG-2 packetization normally expected of video streams.

The asynchronous acquisition of content is based on the capabilities of the receiver, and can be done in parallel with viewing activities, and/or when there is no viewer usage of the receiver.

15 In one embodiment, a satellite or cable receiver with disk storage capability and a single content processing system 40 can use the receiver tuning and acquisition facilities when the user has indicated that the receiver is not being used by pressing an OFF button, or when the viewer is watching content from the disk drive instead of content from the satellite.

20 In another embodiment, a satellite or cable receiver has the functionality dual content processing systems 40 for record-while-viewing and picture-in-picture capability. If neither of these capabilities is being used, then the receiver can acquire content anytime.

25 In another embodiment, a satellite or cable receiver also has Internet access of sufficient speed to acquire content from the Internet given a sufficient amount of time to accommodate speed and latency delivery problems.

### **Management methods**

30 The receiver management methods are processes for accessing, retrieving, storing and deleting content and data.



Embodiments of the receiver 30 will vary in their capabilities, and in particular in the number of instances of the content processing system 40. Embodiments of the receiver can acquire content descriptors and content based on the transmission methods described earlier, and will vary based on the implementation of the receiver.

5 Examples of content descriptor acquisition include the following:

- As part of a completely independent content acquisition stream. This method requires that the receiver either be equipped to handle a separate stream other than the viewed stream, or that the content from such a stream be acquired when the receiver is not used for viewing. In a cable or satellite receiver, this requires component(s) to provide separate frequency tuning, demodulation and decrypting functions, or access to another source or technology like the Internet.
- As part of a co-located stream that can be processed while content is being viewed.
- As part of a dynamic stream that includes both content descriptors and content opportunities.
- As part of a response to a viewer request for content, in which descriptions of alternate versions or segments of the content are included
- By sending a message directly to the receiver

20 For acquiring content, the management method uses a sequence of steps which includes any or all of, but is not limited to, the following steps:

- a) monitoring of the content descriptor transmission stream
- b) matching the content descriptors with the receiver capabilities
- c) verifying that permission is available to access the content
- d) matching of the content descriptors to the viewer information
- e) selecting the descriptors with the strongest content match
- f) if storage is available to the receiver
  - Determining if the content is already in storage
  - Determining if the content can be acquired in a timely manner
  - Verifying access rights to storage
  - Verifying availability of storage

- Making storage available by determining if content can be deleted
  - Making storage available by comparing matches of the new content with existing content in storage, and replacing content with weaker matches
- g) acquiring content from the designated source and placing it in storage

5

The management method also receives characteristic information on the viewers from the operator. This data may be based on the subscription information provided to the operator by the viewer, or information the operator has acquired from other sources.

The viewer data can be received in encrypted or unencrypted format. In one embodiment, to prevent unauthorized access, the data may be kept in encrypted format, and may be kept within the facilities of an RCAS 50.

10

In one embodiment, the data can be stored, but not retrieved from the RCAS 50. Any access to the data is made by a method that is executed within the facilities of the RCAS 50, and the method only returns the result of the matching process.

15

#### **Presentation methods**

The presentation methods process information on content display opportunities, match opportunity to the available content and the viewer information, present the content at the appropriate time, and report on the results.

20

The presentation methods use a sequence of steps which includes any or all of, but are not limited to, the following steps:

For scheduled content opportunities:

25

- a) monitoring the programming stream for opportunities and content descriptors
- b) passing content descriptors to the management methods for assessment
- c) matching the opportunity to the available content and the viewer characteristics
- d) presenting the content to the viewer
- e) updating log
- f) secure logging of the viewing result

30

g) secure reporting of the viewing result

For functional content opportunities:

- 5 a) monitoring of programming and content streams for opportunities and content descriptors
- b) passing content descriptors to the management methods for assessment
- c) pre-matching the opportunities to the available content and viewer characteristics
- d) at function invocation, determining appropriateness of a content insertion
- 10 e) if appropriate, presenting the content to the viewer
- f) updating pre-matched opportunities for next function invocation
- g) secure logging of the viewing result

15 Another example of the use of secure facilities for storage of data and execution of methods is the maintaining of confidentiality of the viewing records, even when use of those records is required for assessing the appropriate content to show when a content viewing opportunity arises. The following sequence illustrates the selection of the ad from a sequence of ads based on previous views:

- 20 a) if all ads in sequence have not been viewed yet, report back sequence number
- b) report the viewing to the reporting facility
- c) if all ads have been viewed:
  - If repeats allowed, reset sequence number and report back the first number in the sequence
  - 25 • If repeats not allowed, report back a different ad

Once the presentation of an alternative piece of content has started, the display of the content is interrupted by the use of functions like channel changes. A characteristic of the content or the opportunity can deem the content to be

30 un interruptible, in which case the content will play to completion before other functions are allowed to proceed. Another characteristic is conditional un interruptability, in which

case the content can continue to play if certain conditions are met. In the case of multiple content channels with synchronized ad start times described earlier, a change to one of the channels in which the opportunity is being co-coordinated would continue to play.

5           The presentation methods can also handle and manage viewer input to control the triggering of functional opportunities. The logging of results can include all inputs from the user. These inputs can be processed within the receiver or at a network site to as part of the analysis of viewing habits and, based on the frequency, selection of inputs, and the resulting content selections, can be used to identify the viewer with a  
10       reasonable probability.

          The detail level of the logging of the interactions and selections can be based on user selections and permissions performed at the receiver, or based on agreements between the network operator and the viewer, with the operator transmitting permissions to the receiver to set the logging level based on the agreements. These  
15       agreements can include some form of payment, discount or other credit for the user.

          The reporting methods can process the data to produce derived data for subsequent targeting opportunities. The processing and the storage of the resulting data can be performed in whole or in part within the facilities of the RCAS 50.

          Following processing and reporting of data, the reporting methods manage the  
20       space used by the data, and can delete data based on temporal factors, completion of processing, reporting and other considerations.

### **Timing mechanisms for content switching**

25           When an opportunity for targeting contents results in the switch from one content stream to another – whether the content is from another stream, storage or another source – the system must switch as seamlessly as possible from the original to the alternate stream.

          Access to an alternate stream may not be instantaneous. Preparation required  
30       prior to switching streams can include:

- Locating and retrieving content from disk

- Access latency related to the storage devices and network performance. Examples include disk access and Internet router and transmission latency
- For concurrent streams, tuning to an alternate frequency and starting the conditional access decryption process

5        Another problem is that the start time is not absolute. A television program does not always start exactly on time – and even if it does, the start time is relative to the content provider's own clock. Even if all content providers operate from the same master clock, factors like satellite transmission delay, MPEG packet jitter and re-clocking and other effects will result in start time variations for different programs when  
10        received by the operator.

      An advance pre-roll trigger can be used to within the opportunity to descriptor to advise the receiver that the content substitution must start in an amount of time relative to a reference clock, at an absolute time relative to a reference clock, or in an amount of time relative to a data trigger. The exact method will depend on the capabilities of the  
15        receiver.

In one embodiment, the timing mechanisms of the interactive TV system used are sufficient to provide the exact timing.

      In one embodiment, the discrete tone multi-frequency (DTMF) or a control signal embedded within an MPEG stream in the source stream is used to generate the data  
20        required in the opportunity descriptor to describe and accurate start point. DTMF signals are used in broadcast streams to announce the arrival of an advertisement in a fixed time signal, and are commonly used for ad insertion in cable companies, as is known to those of skill in the art. The injection filters 18 or 19 detect the time at which the DTMF signal occurs on a reference clock signal, and the opportunity descriptor characteristic  
25        field is generated with a start time relative to the same clock signal or to absolute time with respect to a reference clock. The reference and relative clocks can be MPEG presentation time stamps (PTS) or display time stamps (DTS) within the MPEG stream, or the time-of-day clock stream used in digital television broadcasts, with the DVB SI Time-Date-Table (TDT) as a prominent example.

30        In another embodiment, the DTMF or its MPEG equivalent is used as a trigger to generate an appropriate sequence for an interactive system like ATVEF or OpenTV.

The interactivity commands and/or data sequences are injected into the content stream with appropriate commands and parameters to time the opportunity content switch relative to the insertion of the interactivity stream. This type of insertion would be provided by pre-encoding device 18 or post-encoding device 19.

5        When switching from one content stream to and from an alternative piece of content, perceptible delays are to be avoided.

      In one embodiment, the receiver has a plurality of content processing systems 40. An alternate content processing system can be used to tune to or pre-queue from storage an alternate content stream, and seamlessly or near-seamlessly switch to the  
10       alternate content stream.

      When seamless or near-seamless transitions are not possible, the alternate content can be modified to accommodate delays in tuning to and returning from the alternate content selection. These modifications can include designing the content so that the start and end portions are less relevant and not significant to the message if  
15       missed; a temporal compression of the alternate content so that the start and end are blank or irrelevant for the amount of time it takes, and the message is shortened from its original length through accelerated playback or the removal of selected frames to fit within the shortened display time.

#### **Reporting methods**

20       Reporting methods are used to report both viewing records and viewer behaviour to a reporting facility. The viewing behavior can be used to determine which viewer was actually watching the targeted content selection, or any other content available on the system.

25       A reporting level, selectable by the user or by command transmission from the operator, is used to determine the level of detail the reporting methods will transmit to the operator for data collection and analysis. By agreeing to or selecting a more detailed reporting level, a viewer may receive payment, discount or other consideration from the operator or a statistics-gathering firm like ACNielsen (Stamford, CT).

30       The reporting system also provides facilities to help determine which viewer in a multi-viewer household was watching the content, without requiring any active input

from the user. For the most precise viewer identification, biometric mechanisms can be included in the receiver or the remote control. In one embodiment, the remote control includes a finger or thumb print reader. The remote cannot be used unless the appropriate finger is in the reader portion of the device to identify the user. Simpler and less accurate methods like the selection of a viewer profile on the receiver can be used.

In one embodiment, the viewer inputs to the system are recorded, whether from a remote control, keyboard, front panel switches or other input devices. The combination of key strokes and content selection, through analysis, can determine with a high probability which viewer in the household is currently using the system. The inputs can be analyzed in the receiver or in servers on the operators network.

Any inputs and viewing records must be stored and transmitted securely, and will use any of the RCAS 50 features available. The reporting process will be based on the capabilities of the receiver, and may be done in real-time or on a deferred basis. The deferred basis is particularly important when the network for reporting is the telephone network, and the operator is paying toll charges for the telephone call. An aggregation and occasional reporting of the stored data will reduce in substantial cost savings.

In one embodiment, the results and the reporting are performed by a digital television conditional access system which is normally used for impulse pay-per-view purchase recording. The conditional access system reports both the content targeting data and the pay-per-view purchase data within the same telephone call to reduce operator telephone toll costs.

The detail level of the reporting of the interactions and selections can be based on user selections and permissions performed at the receiver, or based on agreements between the network operator and the viewer, with the operator transmitting permissions to the receiver to set the logging level based on the agreements. These agreements can include some form of payment, discount or other credit for the user.

### **Additional Content Matching and Targeting Mechanisms**

In applicant's co-pending application entitled "Method and System for targeted Advertising", methods were shown for matching content to opportunities, and for using

multiple parameters for the weighting. In addition to the mechanisms and parameters described in that filing, information, methods and parameters are available within existing receiver implementations that can be used for content targeting.

Location information can be stored on digital receivers in the form of a zip or postal code, or a value derived from the zip, postal code or customer address to determine location, and is used to determine time zone for clock display and scheduling functions, and as a geographical access control system for blackouts. Rudimentary profiles are available for presenting customized versions of the EPG to various users of the receiver, or to restrict accessible content for certain viewers. Modes and rating flags are set to lock out programming based on program rating (VCHIP), selected profiles, and categories of operation like pay-per-view purchases. Pay-per-view purchase histories are stored until they can be reported back to the operator.

Using this data allows simple targeting methods in existing receivers without having to implement additional data storage and related security for the targeting system. The data may also be used in conjunction with other data provided and managed specifically for content targeting purposes. The EPG profile currently in use can be added as a parameter to the viewing record to aid in identifying the actual viewer within a plurality of viewers using the receiver.

The applicant's co-pending application entitled "Method and System for targeted Advertising" provides mechanisms for determining the probability that a given viewer or group of viewers will be watching a given content stream (channel) at a given time, and can schedule and value the delivery of advertisements based on the probability. This invention provides mechanisms for a plurality of transmission mechanisms for the various versions of content for targeting opportunities, as well as a plurality of receiver capabilities. Another vector and weighting factor can be added to the matching calculations to include the likelihood that a receiver will be able to watch the content when it is transmitted using a given network mechanism. In this way, and advertiser or programmer can assess the value of adding an additional version of the advertising or content because a desired demographic group may be more likely to have acquired a receiver with dual tuners and/or fast Internet access.



The blackout mechanisms are implemented using geographical area definitions, which are transmitted and matched to the receiver's location. Blackouts are divided in to categories, and there may be a category for each sport, league or even team within a league. For each category, the operator's coverage area is divided into zones. For each category, the receiver belongs to a specific zone. Various mechanisms are available for defining the categories and zones and transmitting the information to the receivers, and these are known to those of skill in the art.

Through use of the existing blackout zone definitions, the matching algorithms are provided with geographical coverage areas that can be used to match content to viewers. Using the same mechanisms, additional categories which are not related to sports can be created to be used solely for content targeting.

In one embodiment, a viewer profile includes a VCHIP restriction on violent content. The presentations methods can take the following steps:

- Based on the rating and channel selections in the provide, assume with a high probability that the viewer is a child
- At the next opportunity to show an advertisement for a pay-per-view movie, show an ad for a children's movie (as opposed to an action or adult movie)

When reporting back on the viewing result, report the likelihood of the ad having been viewed by a child.

### **Content recording and copy protection mechanisms**

Current implementations of video copy protection schemes involve the modification or addition of components of the video to prevent recording on VCR devices. In analog video transmission, the modification is performed by the operator on the transmitted signal. In digital video transmission, data transmitted with the video, usually in the form of a true-or-false value, indicates that the receiver, when playing out the video, must perform the video component modification to prevent connected VCRs from recording the content.

The copy protection scheme is extended to receivers with digital storage to encompass the capabilities of the storage by assigning additional meaning to the copy protection flag. When the transmitted video has an indication of copy protection, the flag can include any or all of the following meanings:

- The receiver is not permitted to record the content to storage
- The receiver is permitted to hold only enough content in storage to allow a pause feature to be implemented. The pause feature may also include a limited amount of rewind time
- The receiver is permitted to record the content to storage, but only if encryption facilities are available. The encryption and subsequent decryption and playback, may require the facilities of the conditional access system.
- Limitations may be placed on the playback, including time limits and number of replays
- The receiver must include analog copy protection mechanisms within the video signal to prevent recording on VCRs
- The ability to record and replay and the time limits and number of replays may be subject to permissions assigned by a conditional access system, or as part of rights acquired during the purchase of a pay-per-view event.

As the current copy protection model is based on a binary true-or-false value of the copy protection flag, the copy protection flag can also be extended as a series of flags or as a data structure with multiple fields to allow explicit specification of any or all of the copy protection features listed herein.

In the case where storage is located on a network facility, the storage may be shared between receivers. A request to store content is compared to other requests, and if another request has been made to store the same piece of content, the request is ignored. However, a record is made of the multiple requests, and the content is not deleted until either all requestors have issued a delete request or the temporal limits on the recording or the associated permissions have all expired.

During the recording process, the content being recorded may include one or more content targeting opportunities. Depending on the attributes described earlier in this invention for selecting targeted content, including the use of specific attributes or the receiver's capabilities, any or all of the following may be implemented in the content recording process:

- The inclusion in the recording of all of the opportunity and content descriptors, to allow the selection of targeted content to occur during playback as it would during live airing
- The recording of the content with the selection of content during opportunities being the same as that which would be made if the content was being watched live
- The recording of the content with an alternate selection based on one of the variable within the matching process being an indicator of whether the content is being watched live, recorded, or watched while being recorded
- If the matching process includes a characterization of "watched while being recorded", then the version of content that is being shown to the watching viewer may be different from the version of content being recorded, provided this capability is available within the receiver.

The selection of an alternate version of content specific to an event being recorded can be implemented whether or not the recording feature is integral to the receiver. In one embodiment, the record feature consists of deferred record function available to a user on a receiver, which, when activated, consists of changing to a selected channel near the time of the start of a program, and the control through infrared signals or other protocols of an external recording device. The state of the receiver during the record process can be recognized and used as an argument within the matching algorithm.

We Claim:

5 1. A method for informing a receiver connected to one or more networks of a content targeting opportunity and for the receiver to exercise the opportunity by selecting and displaying content from a selection of content comprising any or all of the steps of:

- 10 • Securely receiving and securely storing characteristic information about the viewer
- Securely receiving and securely storing characteristic information about a selection of content
- Securely receiving and securely storing characteristic information about viewing opportunities
- 15 • Securely receiving and decrypting the viewer, content and opportunity characteristics
- Determining which versions of content are physically accessible to the receiver based on the characteristics of the content and the opportunity
- Determining which versions of the content the receiver is permitted to access
- 20 • Running an opportunity matching process to determine which accessible and permitted versions of the content best match the viewer, opportunity and content characteristics and records of prior content viewing
- Accessing and displaying the content when the opportunity is exercised
- Securely storing the results of the content viewing
- 25 • Securely reporting the information on the content viewing to a reporting facility.

2. A method for a receiver connected to one or more networks to select and acquire content from a selection of content for subsequent targeted content viewing opportunities comprising any or all of the steps of:

- 30 • Securely receiving and securely storing characteristic information about the viewer

- Securely receiving and securely storing characteristic information about a selection of content
- Securely receiving and securely storing characteristic information about viewing opportunities
- 5     • Securely receiving and decrypting the viewer, content and opportunity characteristics
- Determining which versions of content are physically accessible to the receiver based on the characteristics of the content and the opportunity
- Determining which versions of the content the receiver is permitted to access
- 10    • Running a content matching process to determine which accessible and permitted versions of the content best match the viewer, opportunity and content characteristics and records of prior content viewing
- Determining if permission is available to use storage accessible to the receiver with characteristics suitable for real-time playback with predictable content access latency characteristics ("local storage")
- 15    • Determining if sufficient space is available on local storage, and deleting any less-suitable content to make space available
- Acquiring and storing the content on the local storage

#### OPPORTUNITY TYPES

- 20    3. The method of claim 1, where the opportunity is based on the invocation of a function or group of functions on the receiver device
4. The method of claim 1, where the type of content selected can be based on the characteristics of the opportunity
5. The method of claim 1, where the characteristics of the opportunity and/or content
- 25    can cause the process to select the content for display based on the timing and/or content selection for prior opportunities
6. The method of claim 1, where the characteristics of the opportunity and/or content can cause the process not to select any content for display based on the timing and/or content selection for prior opportunities

#### 30    CONDITIONAL ACCESS

7. The method of claims 1 and 2, where the opportunity matching process and/or the content matching process can be executed in whole or in part within one or more components of a receiver and/or to one or more devices on a network
8. The method of claim 1 and 2, where the viewer characteristics can be located in whole or in part within one or more components of a receiver and/or to one or more devices on a network
9. The methods of claims 1 and 2, where any or all of the permission to access storage, the storage of some or all of the characteristics, the execution of all or a portion of the opportunity matching process and/or the content matching process, the storage of the content viewing results, and the communication or the viewing results can be performed and managed on one or more of the following facilities:
- a smart card
  - a security module which can include software and interfaces to the receiver and a smart card
  - the facilities of an analog or digital television conditional access system, which may include any of a smart card, a security module and other hardware within the system
  - the facilities for electronic commerce system, which may include a smart card, a security module and other hardware within the system
  - a smart card which has an operating system that allows multiple independent applications
  - one or more grant/deny type servers accessible on a network
  - one or more Kerberos or other ticket server systems accessible on a network
  - an interactive application system including those in claim 23
10. The methods of claims 1 and 2, where, in whole or in part the characteristics of the content, applications and/or viewers can be encrypted prior to transmission and decrypted and accessed using any of the facilities of claim 9.
11. The methods of claims 12 where the encryption and decryption can use any of the facilities of claim 9.

12. The method of claims 1 and 2, where the content, opportunity and viewer descriptors can include a variable and extensible number of characteristics

13. The method of claims 1 and 2, where all or a portion of the algorithm for the processes for matching the content, viewer and/or opportunity characteristics can be transmitted as one of the opportunity or content characteristics

14. The methods of claims 1 and 2 where the viewer characteristics can beindependently available on the receiver, including any of the facilities of claim 9, including but not limited to:

- Postal code
- Telephone number
- Access permissions, including digital television service and channel authorizations
- Prior purchases, including television pay-per-view movies
- Viewer channel selection and EPG display profiles
- Viewer content filtering criteria, including VCHIP settings and ratings

15. The methods of claims 1 and 2, where the execution of the content matching process and/or the opportunity matching process can be performed within any of the facilities of claim 9, so that only some or none of the characteristics are retrieved from the facilities of claim 9, and only the result of the matching processes is returned without returning any of the characteristics

16. The methods of claims 1 and 2, where the characteristic information for an instance of content can include one or more of the following:

- A maximum number of repetitions
- A minimum amount of time between showings
- A maximum number of incomplete repetitions
- A time window for usage
- Technical requirements for usage of the content on the receiver
- The source or sources for the content
- A sequence number for content consisting of multiple instances of content within a sequence

17. The methods of claims 1 and 2, where the exercising opportunity can be based on the invocation of a function on the receiver, including:

- Turning on the receiver
- Turning off the receiver
- 5     • Starting the playback of stored content
- Pausing the playback of stored content
- Starting a communication session
- Stopping a communication session
- Pausing the viewing of broadcast content through the use of time-delay storage
- 10     features
- Resuming the viewing of broadcast content following the use of time-delay storage features

18. The methods of claims 1 and 2, where the opportunity can be based on any one of a plurality of advertising slots available on a plurality of channels which are

15     related for the purposes of sharing the advertising on each channel for managing and targeting the advertising opportunities

19. The methods of claims 1 and 2 where the opportunity can be based on any one of a plurality of advertising slots available on a single channel.

20. The methods of claims 1 and 2 where the opportunity and selection of content

20     can be based on a combination of the exercising of opportunities based on a combination of any or all of the methods of claims 16, 17, 18 and 19 and the frequency of, time of, and time separating the exercising of said opportunities

21. The methods of claims 1 and 2 where the receiver can be connected to one or more networks which can consist of any one or more of the following, but not

25     limited to:

- a direct-to-home satellite broadcasting system (DTH)
- a cable television network
- a terrestrial radio frequency network, including LMDS and MMDS
- a packet switched terrestrial network, including ATM and DSL networks



- packet switched or routed networks consisting of multiple channels on multiple streams of the transport layer, including but not limited to ATM virtual circuits in all their embodiments, and IP unicast or multicast streams
- a terrestrial cellular communication network, including telephone networks
- 5     • the public telephone network
- the Internet, through cable, xDSL, telephone, wireless or other broadband connection methods, including MMDS and LMDS
- a terrestrial television broadcast network, including NTSC, ATSC, DVB and other protocols

10     22. The methods of claims 1 and 2, where the transmission protocol for the characteristics can consist of one or more of the following operating over the networks of method 21, including but not limited to:

- MPEG transport streams
- 15     • DVB transport streams
- Vertical blanking interval or other portions of television signals allowing the carriage of data, including ATVEF transport A and transport B streams
- TCP/IP transport streams, either directly within the networks of method 21, as defined within another specification like DVB or any of the IETF specifications
- 20     • Private data fields within a DVB Event Information Table (EIT)

23. The methods of claims 1 and 2, where the algorithms, processes and characteristics can be represented as part of or extensions to the specifications of one or more interactive applications and communication specifications, including but not limited to:

- 25     • JavaTV
- OpenTV
- ATVEF
- DVB MHP
- WAP
- 30     • NTT DoCoMo

- Wink

24. The methods of claims 1 and 2 where the receiver is a digital set-top cable or satellite television receiver; a set of components within a television; a personal computers with appropriate network connections, a cellular telephone or a personal digital assistants (PDA); or a gaming console.
25. The methods of claims 1 and 2 where the receiver can have the ability to handle multiple content streams simultaneously, allowing the acquisition of characteristics and content simultaneously with the viewing of content
26. The methods of claims 1 and 2 where the receiver can acquire content using viewing facilities when the receiver is not being used for viewing
27. The methods of claims 1 and 2 where the content alternatives can consist of content on a variety of services which are unrelated except for the synchronization of the start and end times of the content alternatives
28. The methods of claims 1 and 2 where the content alternatives can consist of streams of alternative content which can be used by a plurality of services as a source of content alternatives, and the scheduling of the alternate content and the services allows the alternatives to be shared among the plurality of services
29. The methods of claim 28 where the bandwidth can be available from services which are not airing through simultaneous substitution requirements
30. The methods of claim 28 where the bandwidth can be available from services which are temporarily off air, whether on a regular or occasional basis.
31. The methods of claims 1 and 2 where the alternative versions of content can be available from a switched network like DSL
32. The methods of claims 1 and 2 where the content alternatives can be transmitted in non-real-time, being either faster or slower than real-time, using methods other than the primary content transfer mechanism
33. The methods of claims 1 and 2 where the start point for the switch to an alternative content stream can be based on timing relative to a reference clock, where the relative clocks consists of any one of:
  - A time-of-day reference time stream available to the receiver, of which the DVB time date table (TDT) is an example

- An MPEG presentation time stamp (PTS)
- An MPEG display time stamp (DTS)

34. The methods of claims 1 and 2 where the start point for the switch to an alternative content stream can be based on an amount of time from a detectable event in the video stream, such as the DTMF signal other trigger mechanisms or data elements that can be used as trigger mechanisms within analog or digital streams

35. The methods of claims 1 and 2 where the matching can be based on geographical locations and the locations and the receiver's knowledge of its location are based on the technology used to implements black-outs within the receiver, through a matching of content to each area within the black-out pattern.

36. The methods of claims 1 and 2 where the user's inputs can be recorded and reported to calculate the probability of which viewer within a household was watching the program at any given time

37. The methods of claims 1 and 2 where the level of detail of detail to be reported can be based on the permission the user has agreed to, and the level can be controlled within the receiver functions

38. The methods of claim 37 where the viewer's permission is obtained by one or more of the following:

- An agreement at the time of acquisition of the receiver by the viewer, which may be obtained through a subsidized purchase or rental price
- A reduction in the price of the service, or a credit towards specific services
- A direct payment to the viewer

39. The methods of claims 1 and 2, where the viewing of the selected content alternative can be deemed to be uninterruptible, regardless of the action taken by the user on the inputs to the receiver

40. The methods of claims 1 and 2, where the indications that the content is being recorded or is to be recorded at a later time can be used as a criteria for matching the content to the opportunity

41. A method for providing copy protection on the content being transmitted by using existing copy protection indicators and/or extensions to those indications to indicate one or more of the following restrictions are in place for the content:

- The receiver is not permitted to record the content to storage
- 5   • The receiver is permitted to hold only enough content in storage to allow a pause feature to be implemented. The pause feature may also include a limited amount of rewind time
- The receiver is permitted to record the content to storage, but only if encryption facilities are available. The encryption and subsequent decryption and playback,  
10   may require the facilities of the conditional access system.
- Limitations may be placed on the playback, including time limits and number of replays
- The receiver must include analog copy protection mechanisms within the video signal to prevent recording on VCRs
- 15   • The ability to record and replay and the time limits and number of replays may be subject to permissions assigned by a conditional access system, or as part of rights acquired during the purchase of a pay-per-view event.

42. The methods of claims 2, where the storage is a pool of storage available on any of the connected networks, and the content is managed in a manner that any  
20   specified piece of content is only stored once on the network, even though multiple users or the content selection methods for those users have requested storage of the content

43. The methods of claims 2, where the characteristics of content that is already stored can be updated by transmitting changes to the characteristics

25   44. The methods of claims 1 and 2 where multiple versions of interactive applications can be sent on and cached from one stream, and triggered after the service has been switched to an alternative content stream.

45. The methods of claims 1 and 2 where the receiver can have the ability to handle multiple content streams simultaneously, and the facilities for handling a separate  
30   stream is used for tuning to or queuing from storage the alternate content display to allow a seamless or near-seamless transition to and from the alternate stream.

46. The methods of claims 1 and 2 where the content can be modified to accommodate delays in tuning to and returning from the alternate content selection. These modifications can include designing the content so that the start and end portions are less relevant and not significant to the message if missed; a  
5 temporal compression of the alternate content so that the start and end are blank or irrelevant for the amount of time it takes, and the message is shortened from its original length through accelerated playback or the removal of selected frames to fit within the shortened display time.

47. The methods of claims 1 and 2 where the selection of the content alternatives,  
10 the selection and attribution of characteristics to opportunities and content, the transmission mechanisms selected for the content and opportunities, and the methods used for matching the content and opportunities can be based on yield management methods, an example of which is optimal dynamic pricing.

48. A method for informing a receiver connected to one or more networks of a  
15 content targeting opportunity and for the receiver to exercise the opportunity by selecting and displaying content from a selection of content, the method comprising the steps of:

receiving and storing characteristic information about the viewer;

receiving and storing characteristic information about a selection of

20 content;

receiving and storing characteristic information about viewing opportunities;

determining which versions of content are physically accessible to the receiver;

25 determining which versions of the content the receiver is permitted to access;

running an opportunity matching process to determine which accessible and permitted versions of the content match the viewer, opportunity and content characteristics ;

30 accessing and displaying the content when the opportunity is exercised;

storing the results of the content viewing;

reporting the information on the content viewing to a reporting facility.

- 5           49. A method of selecting and acquiring content from a selection of content for subsequent targeted content viewing opportunities by a receiver connected to one or more networks, the method comprising the steps of:
- receiving and storing characteristic information about the viewer;
  - receiving and storing characteristic information about a selection of content;
  - 10           receiving and storing characteristic information about viewing opportunities;
  - determining which versions of content are physically accessible to the receiver;
  - determining which versions of the content the receiver is permitted to
  - 15           access;
  - running a content matching process to determine which accessible and permitted versions of the content best match the viewer, opportunity and content characteristics;
  - determining if permission is available to use storage accessible to the
  - 20           receiver with characteristics suitable for real-time playback with predictable content access latency characteristics ("local storage");
  - determining if sufficient space is available on local storage;
  - deleting content to make space available;
  - acquiring and storing the content on the local storage.
- 25

Figure 1 Network System 10

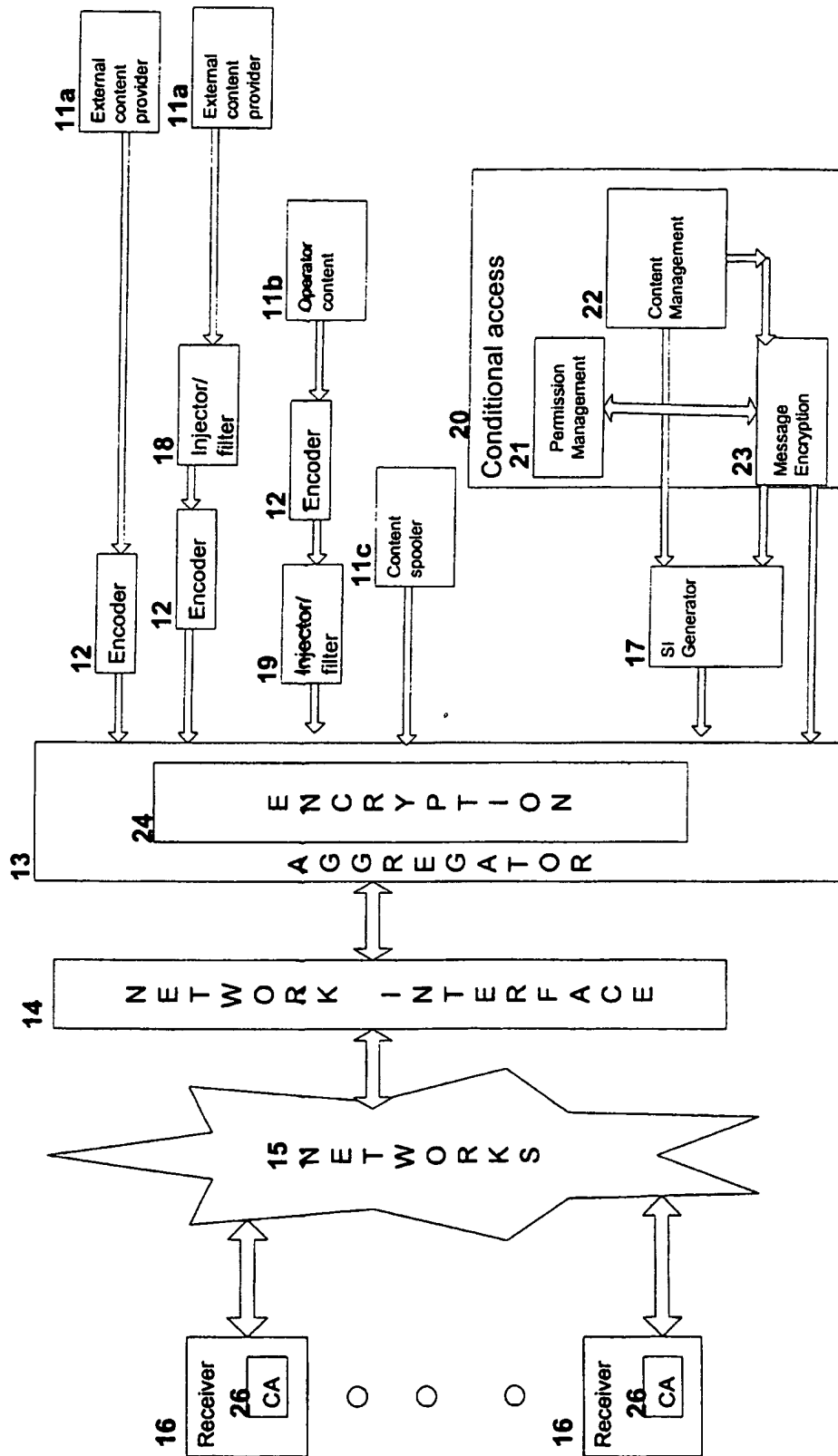


Figure 2 Receiver System 30

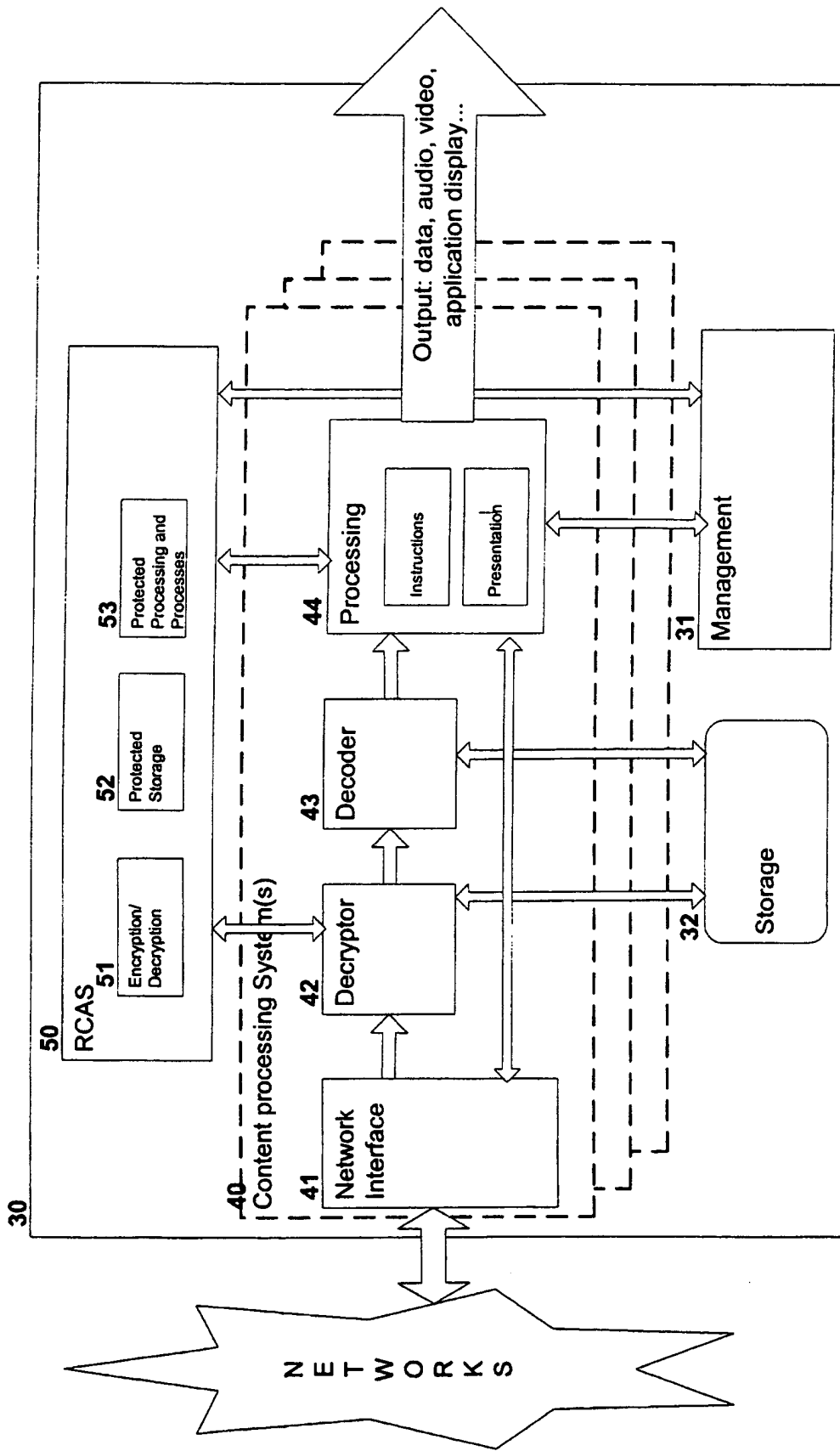




Figure 3 Targeting Methods 60

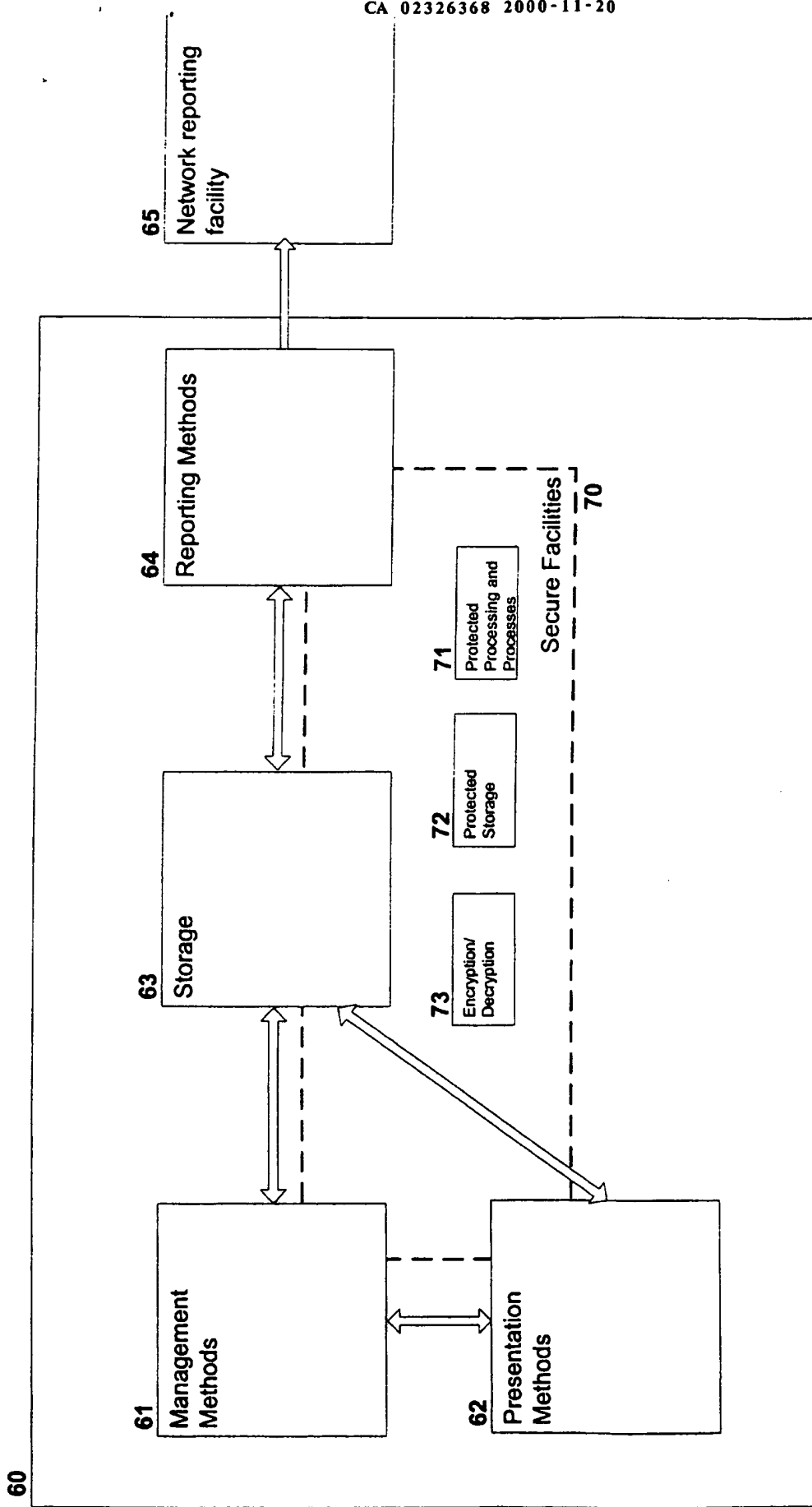


Figure 4 – Content Descriptors

Description	Content type 81	Content Source 82	Content characteristics 83	Content identifier 84
Ad 1 with optional interactivity	Audio=yes, video=yes, ATVEF interactivity=yes	Channel 204 real time	Area=California, type=tv ad	1111
Ad 2 with mandatory interactivity	Audio=yes, video=yes, ATVEF interactivity=mandatory	Channel 205 real time	Area=MidWest, type=tv ad	1112
Ad 1 of 3 for new car model	Audio=yes, video =yes	Internet	Area=everywhere else, type=tv ad	1113.1
Ad 2 of 3 for new car model	Audio =yes, video =yes	Internet	Area=Northern states, type=tv ad	1113.2
Ad 3 of 3 for new car model	Audio=yes, video = yes	Internet	Area=Southern states, type=tv ad	1113.3
Ad 1 for play during pause	Audio=no; video=yes, ATVEF interactivity=yes	Channel 206 14:02	Area=all, type=pause ad; duration=30	1114
Ad 2 for play during pause	Audio=no; video=yes, ATVEF interactivity=yes	Channel 206 14:04	Area=all, type=pause ad, interruptible=no; duration=5	1115

Figure 5 – Opportunity descriptors

Description	Opportunity type 85	Opportunity Content 86 Source 82	Opportunity Context 87	Opportunity method 89	Opportunity descriptors 90	Opportunity Identifier 88
Ad insertion opportunity 1 on CNN	Type=absolute time; time=(14:02; 14:04)	1111,1112	channel=CNN;	geography_ match		2111
Ad insertion opportunity 2 on any of CNN, HNN or CNNFN	Type=relative time; time=(trigger 2112 + 300 frames)	1111,1112	channel=(CNN,H NN, CNNFN);	Income_match	1111 if < 100000; 1112 if >= 100000	2112
Ad insertion when receiver started	Type=function	1113.X	function=on;	play_all_in_ sequence		2113
Ad insertion when returning from pause	Type=function	1114, 1115	function=pause_re turn;	match_to_ pause_ duration		2114